SECTORIAL CONJUNCTIVAL EPITHELIECTOMY AND AMNIOTIC MEMBRANE TRANSPLANTATION FOR PARTIAL LIMBAL STEM CELLS DEFICIENCY

EPITELIECTOMÍA CONJUNTIVAL SECTORIAL Y TRASPLANTE DE MEMBRANA AMNIÓTICA EN INSUFICIENCIA LIMBAR PARCIAL

DÍAZ-VALLE D1, SANTOS-BUESO E1, BENÍTEZ-DEL-CASTILLO JM1, MÉNDEZ-FERNÁNDEZ R2, LÓPEZ-ABAD C1, MARTÍNEZ-DE-LA-CASA JM1, GARCÍA-SÁNCHEZ J1

ABSTRACT

Case report: A 74-year-old man developed a partial limbal stem cell deficiency secondary to a chemical injury in the left eye. He was treated with a sectorial conjunctival epitheliectomy and amniotic membrane transplantation. After 3 weeks there was an intact, smooth and stable corneal epithelium.

Discussion: This case report emphasizes that conjunctival epitheliectomy and amniotic membrane transplantation appears to be a safe and effective method of restoring a stable corneal epithelium for cases of partial limbal stem cell deficiency (Arch Soc Esp Oftalmol 2007; 82: 769-772).

Key words: Conjunctival epithelium, corneal epithelium, corneoscleral limbus, amniotic membrane, limbal insufficiency.

RESUMEN

Caso clínico: Varón de 74 años de edad desarrolló una insuficiencia limbar parcial secundaria a una causticación en el ojo izquierdo. Fue tratado mediante la realización de una epiteliectomía sectorial conjuntival asociada a injerto de membrana amniótica. 3 semanas más tarde existía un epitelio corneal íntegro, estable y regular.

Discusión: Este caso demuestra como la realización de una epiteliectomía sectorial asociada al injerto de membrana amniótica es un método eficaz y seguro para restaurar una superficie corneal estable en los casos de insuficiencia limbar parcial.

Palabras clave: Epitelio conjuntival, epitelio corneal, Limbo escleroconreal, membrana amniótica, insuficiencia limbar.
INTRODUCTION

In the sclerocorneal limbus, at the level of Vogt’s girdle, there is an epithelial cell population known as limbal stem cells. It is believed that these cells are responsible for the regenerating function which maintains the corneal epithelium and the barrier function against migration of conjunctival cells over the cornea (1). The loss of said functions is known as limbal insufficiency (LI) and can arise as a consequence of the direct destruction of said cell population or their stromal micro-environment. At the histopathological level, LI is characterized by conjunctivalization with the presence of cup-shaped cells over the cornea, vascularization, destruction of the corneal basal membrane and chronic inflammation (2).

Treatment of a complete LI requires the transplant of a sufficient amount of limbal stem cells to achieve corneal re-epithelialization with cells having the right phenotype. In partial LI, Dua has demonstrated the usefulness of debriding the conjunctival epithelium covering the cornea so that the denuded area is covered by an epithelium having corneal characteristics originating in the healthy limbal areas. This technique has become known as «sectoral conjunctival epitheliectomy» (SCE) (3). Other authors such as Anderson et al (4) performed the technique associated to an amniotic membrane transplant (AMT) to facilitate the maintenance and expansion of limbal epithelial cells. According to said authors, the results of the combined procedure are superior to repeated debridements of the conjunctivalized corneal surface, although there is a risk of late failures in the ocular surface.

Below is the case of the 74-year old patient with partial unilateral limbal insufficiency with long evolution, successfully treated with SCE associated to AMT.

CASE REPORT

A 74-year old male patient visited the practice due to recurrent painful red eye episodes in the LE associated to progressive vision loss dating several months back. He did not refer relevant systemic personal history. Of note in his ophthalmic history is an accidental exposure to a cleaning product 15 years back.

The ophthalmological exploration revealed a visual acuity (VA) of 8/10 in the right eye (RE) and 1/10 in left eye (LE). The biomicroscopic exploration showed the existence in the LE of an area of about 210º of corneal conjunctivalization involving the visual axis, with superficial vascularization and mixed hyperemia (fig. 1). There was a limbus sector of about 5 hours covering the normal architecture of Vogt’s girdle and the absence of color with dyes. The rest of the exploration did not produce relevant findings.

With the clinical diagnostic of partial LI with visual axis involvement, an CSE was made on the fibrovascular tissue invading the corneal surface, including the involved limbal area and respecting the nasal limbus sector having normal characteristics. The denuded area was covered with an amniotic membrane graft (AM) sutured with the epithelium upwards, to which an additional circular AM fragment was added (15 mm diameter), sutured as a patch with the epithelium downwards (fig. 2). During the follow-up, a progressive re-epithelization by an epithelium with corneal characteristics over the AM graft which became integrated (fig. 3). Three weeks after the surgery the eye exhibited a smooth and regular epithelial corneal surface and an important reduction of the associated mixed hyperemia (fig.4). The VA of the LE improved up to 4/10. With an 8-month follow-up, no relapses have been observed.

The ophthalmological exploration revealed a visual acuity (VA) of 8/10 in the right eye (RE) and 1/10 in left eye (LE). The biomicroscopic exploration showed the existence in the LE of an area of about 210º of corneal conjunctivalization involving the visual axis, with superficial vascularization and mixed hyperemia (fig. 1). There was a limbus sector of about 5 hours covering the normal architecture of Vogt’s girdle and the absence of color with dyes. The rest of the exploration did not produce relevant findings.

With the clinical diagnostic of partial LI with visual axis involvement, an CSE was made on the fibrovascular tissue invading the corneal surface, including the involved limbal area and respecting the nasal limbus sector having normal characteristics. The denuded area was covered with an amniotic membrane graft (AM) sutured with the epithelium upwards, to which an additional circular AM fragment was added (15 mm diameter), sutured as a patch with the epithelium downwards (fig. 2). During the follow-up, a progressive re-epithelization by an epithelium with corneal characteristics over the AM graft which became integrated (fig. 3). Three weeks after the surgery the eye exhibited a smooth and regular epithelial corneal surface and an important reduction of the associated mixed hyperemia (fig.4). The VA of the LE improved up to 4/10. With an 8-month follow-up, no relapses have been observed.
DISCUSSION

The basis for performing a SCE is that large corneal epithelial defects with limbal involvement can be regenerated by means of cell migration from the healthy epithelial areas, while limbal cells can experience a circumferential migration from both ends of the healthy limbal area in an attempt to cover the entire limbal surface. However, said migration is inhibited when a conjunctival epithelium area goes through the limbus and makes contact with the proliferative limbal epithelium (5). It has been estimated that 25% of the healthy limbus would be enough to repopulate the entire corneal surface. In cases where the healthy limbal area covers under 3 hours, the strategy should only focus on the de-epithelization of the central corneal area for it to be covered by a normal epithelium at the expense of the healthy limbus (3).

The beneficial effect of associating an AMT is based on the restoration of an intact basal membrane which is usually damaged in LI. AM is an ideal substrate which facilitates the adhesion, differentiation and expansion of proliferating epithelial cells as well as suppressing cellular apoptosis. The stromal portion of AM also provides a number of additional benefits due to its anti-inflammatory and anti-angiogenic effects together with the release of numerous growth and protease-inhibiting factors (4).

In conclusion, the instant case confirms the usefulness of performing an SCE and associating AMT to achieve corneal re-epithelization, at least in the mid-term, on the basis of healthy limbal areas in extended partial LI having over 25% of the limbus in healthy condition.

REFERENCES

